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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/507,432	02/10/2005	Bernd Bauer	26334	6276

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1030 15th STREET, NW
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EXAMINER

ZALUKAEVA, TATYANA

ART UNIT	PAPER NUMBER
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1713

DATE MAILED: 05/06/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/507,432

Applicant(s)

BAUER

Examiner

Tatyana Zalukaeva

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10 February 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 26-61 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 26-61 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 9/04 and 12/04.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

1. Claims 29, 31, are objected to because of the following informalities: the "...arylene" should have letter "e" at the end. Appropriate correction is required.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claim 39 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

4. Claim 39 recites the limitation "optionally modified zirconium phosphate". There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 26-30, 32-36, 40, 57-61 are rejected under 35 U.S.C. 102(b) as being anticipated by Grot et al (U.S. 5,919,583).

Disclosed are membranes, having enhanced proton conductivity made from polymer having cation exchange groups and containing inorganic filler dispersed within the polymer (abstract, col.2, lines 20-25). Preferably inorganic filler is an inorganic proton

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conductor, preferably it is zirconium phosphate proton conductor having a conductivity of at least about 10^{-4} s/cm (col.2, lines 30-35). The invention also provides a fuel cell, wherein the membrane is serving as a separator (col.2, lines 51-57). Membrane in accordance with the invention is made of a polymer having cation exchange groups which can transport protons across the membrane. With specific regard to claims 29, 20, Grot discloses zirconium hydrogen phosphate $\text{Zr}(\text{HPO}_4)_2$ (col.7, lines 8-10, example1). The cation exchange groups are preferably selected from the group consisting of sulfonate, carboxylate, phosphonate, imide, sulfonimide and sulfonamide groups (col.3, lines 29-35). This reads on the limitations of claim 36. Decreased methanol permeability of the membrane, as per instant claim 57 is shown by table 1 in col.12. With regard to claim 40, Grot teaches that inorganic proton conductor is within 2-30% by weight of the membrane (col. 2, lines 35-37).

7. Claims 26-44 and 57, 58-61 are rejected under 35 U.S.C. 102(b) as being anticipated by Bonnet et al J. New Mat. Electrochem. Systems, 3 (2000) 87-92). Sulfoanated polyetheretherketone has been used as polymer matrix for hybrid membrane formation with inorganic proton conductors. Membrane incorporates up to 40% of inorganic filler among which zirconium phosphate and zirconium phosphate sulfophenylphosphonate are named in the abstract. The membrane containing 30% of zirconium phosphate and 40% of zirconium phosphate sulfophenylphosphonate has conductivity of 0.03-0.09 s/cm at 100% humidity and 100C (abstract and experimental in right column of page 88). Layered proton conductors are named in second paragraph of left column on page 88.

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The method of making proton-conducting composite membrane is discussed in Bonnet as follows: In an appropriate solvent layered zirconium phosphate or phosphonate forms colloidal suspension (this reads on the steps (a) and (b) of the instant claim 41. Transfer of this colloidal suspension into a polymer solution enable the inorganic particles of nanometer size to be dispersed in the formed membrane (this reads on steps (c) and (d) of the instant claims 41-44). See second paragraph of left column on page 88, and experimental part in the same column of page 88, and Table 1

The limitations of claims 58-61 are inherent in both references discussed above, since the composition and its properties are inseparable, *In re Spada*, 911 F 2d 705, 709 15 USPQ 1655, 1658 (Fed. Cir. 1990). When the claimed compositions are not novel, they are not rendered patentable by recitation of properties, whether or not these properties are shown or suggested in prior art.

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

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1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

10. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

11. Claims 41-56 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bonnet et al J. New Mat. Electrochem. Systems, 3 (2000) 87-92 in view of Alberti et al Journal of Colloidal and Interface Science, vol.107, No.1, 1983, pp 256-263.

Bonnet discloses the process as described in claim 41, i.e. employing steps (b), (c) and (d) of the instant claim 45. The disclosure of Bonnet differs from the instant claim 45 by not specifying that zirconium phosphate is being exfoliated by intercalation with alkyl amine. Alberti et al disclose exfoliation of zirconium phosphate by intercalation deintercalation process using propyl amine. Such exfoliation of crystals was found to give rise to aqueous colloidal suspensions of zirconium phosphate. It is also known and described in Alberti, that exfoliation by intercalation-deintercalation promotes separations layers of zirconium phosphate apart and weaken the forces that keep

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macromolecules together in the crystal. Therefore, based on the need of Bonnet to enhance the penetration of zirconium phosphate into the polymer matrix and transfer of this colloidal suspension into a polymer solution, one skilled in the art would have found obvious to perform formation of improved colloidal suspension according to Alberti by exfoliation of zirconium phosphate in order to enable the phase transfer of suspension of zirconium phosphate into solution of polymer as required by Bonnet, and thus to be dispersed in the formed membrane, as called in the instant claims. The limitations of claims 45-55 are disclosed in Bonnet, as discussed above.

Other prior art references show the state of the art in solid state protonic conductors.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tatyana Zalukaeva whose telephone number is (571) 272-1115. The examiner can normally be reached on 9:00 - 5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Wu can be reached on (571) 272-1114. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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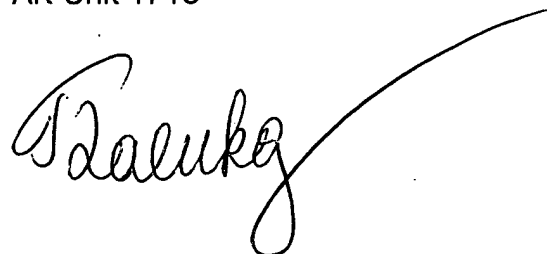
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Tatyana Zalukaeva

Primary Examiner

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May 2, 2005

A handwritten signature in black ink, appearing to read 'T. Zalukaeva', with a long, sweeping horizontal stroke extending to the right.